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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/591,231

08/31/2006

Kei Tashiro

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22852

7590

08/19/2010

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EXAMINER

BUTTNER, DAVID J

ART UNIT

PAPER NUMBER

1796

MAIL DATE

DELIVERY MODE

08/19/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/591,231	Applicant(s) TASHIRO ET AL.	
	Examiner David Buttner	Art Unit 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 June 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☒ Claim(s) 9 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Claim 1 rejected under 35 U.S.C. 103(a) as being unpatentable over SU422262 in view of Tanaka 6204358.

The SU422262 exemplifies (#2) reacting carbon dioxide with an epoxidized polyisoprene. The carbon dioxide and epoxy group produce cyclocarbonate groups (page 2 line 4 of reference). As recognized by applicant (page 6 line 28), natural rubber is primarily polyisoprene.

SU422262 does not state the source of its polyisoprene.

Natural rubber (a polyisoprene) is known to be superior to synthetic rubber in mechanical properties (col 1 line 28-36 of Tanaka).

It would have been obvious to utilize a natural rubber as the source of SU422262's polyisoprene for the expected advantages.

Claims 1-8 rejected under 35 U.S.C. 103(a) as being unpatentable over SU422262 in view of JP2002053573 in further view of Tanaka 6204358.

The SU422262 exemplifies (#2) reacting carbon dioxide with an epoxidized polyisoprene. The carbon dioxide and epoxy group produce cyclocarbonate groups (page 2 line 4 of reference). As recognized by applicant (page 6 line 28), natural rubber is primarily polyisoprene.

SU422262 does not state the carbon dioxide is provided in a supercritical state or state the source of its polyisoprene.

JP2002053573 (abstract) teaches epoxy groups can be reacted with supercritical carbon dioxide to form cyclocarbonate without the need of a catalyst. It would have been obvious to carry out SU422262's CO₂/epoxy reaction under supercritical

conditions in order to avoid using a catalyst. The expense of the catalyst and separation problems associated with the catalyst are therefore avoided (paragraph 2 of JP2002053573). The reaction conditions of JP200205373 include pressures of 60-90kg/cm² (paragraph 15); temperatures of 70-180⁰C (paragraph 14); times of 30 min-24 hours (paragraph 16) and dimethylformamide solvent (paragraph 12).

Natural rubber (a polyisoprene) is known to be superior to synthetic rubber in mechanical properties (col 1 line 28-36 of Tanaka). Additionally, removal of non-rubber components from such natural rubber (ie “deproteinizing”) is known to improve mechanical properties and result in more uniform batch to batch properties (col 2 line 44-58) and reduce allergic skin reactions (col 2 line 28-37).

It would have been obvious to utilize a “deproteinized” natural rubber as the source of SU422262’s polyisoprene for the expected advantages.

Note that applicant’s claim 5 does not require an ionic liquid be present, but merely limits the species of ionic liquid in the markush group of claim 3.

Claims 1-8 rejected under 35 U.S.C. 103(a) as being unpatentable over SU422262 in view of the Kawanami article in Society of Chemical Engineers Japan in further view of Tanaka 6204358.

SU422262 does not state the carbon dioxide is provided in a supercritical state or state the source of its polyisoprene.

Kawanami teaches epoxy groups can be reacted with supercritical carbon dioxide in the presence of ethylmethylimidazole tetrafluoroborate to form cyclocarbonate in times (eg 2 hours) much shorter than SU422262 (eg 14-20 hours). It would have

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been obvious to conduct the SU422262 reaction of epoxidized polyisoprene with CO₂ under supercritical conditions to hasten reaction time.

Kawanami's reaction conditions include a pressure of 6MPa and temperature of 80°C.

Natural rubber (a polyisoprene) is known to be superior to synthetic rubber in mechanical properties (col 1 line 28-36 of Tanaka). Additionally, removal of non-rubber components from such natural rubber (ie "deproteinizing") is known to improve mechanical properties and result in more uniform batch to batch properties (col 2 line 44-58) and reduce allergic skin reactions (col 2 line 28-37).

It would have been obvious to utilize a "deproteinized" natural rubber as the source of SU422262's polyisoprene for the expected advantages.

Note that applicant's claim 4 does not require these amide solvents be present, but merely limits the species of nonionic solvents in the larger markush group of claim 3.

Claim 9 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

There doesn't appear to be any motivation to liquefy by depolymerization the rubber of SU422262.

Applicant's arguments filed 6/22/10 have been fully considered but they are not persuasive.

Applicant argues it is impossible to epoxidize natural rubber without first deproteinizing the rubber and that such knowledge was not known in the art at the time of applicant's invention.

This is not convincing. Applicant's original specification clearly states proteins can be present (page 7 line 5). Secondly, the article in the European Polymer Journal 39 of 2003 shows that natural rubber can be epoxidized without deproteinization. See the schematic illustration of fig 1 and the epoxy group contents of table 2. "NR" meaning natural rubber (without deproteinization) and "DPNR" meaning deproteinized natural rubber. Interestingly, a number of the authors of the article are also listed as inventors in the instant application. Applicant's article completely contradicts applicant's argument. Thirdly, Tanaka 6797783 and its equivalent JP06329702 show that well before applicant's invention, it was known in the art that deproteinizing natural rubber can improve epoxidation ratio relative to natural rubber that hasn't been deproteinized see (col 2 line 53-53; table 2 of Tanaka). Tanaka refutes applicant's argument that it is impossible to epoxidize natural rubber without deproteinization. Furthermore, Tanaka shows that it is expected (not unexpected) that deproteinization would improve the epoxidation step. This provides additional motivation to deproteinize the polyisoprene if natural rubber is to be the source of the polyisoprene.

Limiting claim 1's structure to "consist" of the pictured units required the new rejection. The examiner relies on applicant's assurances that natural rubber has no other units as does synthetic polyisoprene. The claims are therefore construed as not permitting any units in addition to those pictured in formula (I) of claim 1.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Buttner whose telephone number is 571-272-1084. The examiner can normally be reached on weekdays from 10 to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jim Seidleck, can be reached on 571-272-1078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

David Buttner

8/13/10

/David Buttner/

Primary Examiner, Art Unit 1796